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(54) PLASTICS-FILM CONTAINERS

(71) We, IMPERIAL CHEMICAL INDUSTRIES LIMITED, Imperial Chemical House, Millbank, London SW1P 3JF, a British Company,

do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a plastics-film container, and more particularly to a plastics-film container required in use to contain superatmospheric pressure.

In United Kingdom Specification 1,302,450 we have described a method of closing an open end of a plastics-film container, especially one intended for contents at superatmospheric pressure, that comprises forming an elongated heat-seal between the flat, opposed layers of the plastics film at or towards their edges and along the whole length of said open end, folding the end of the container over, inwardly of the seal, so that the seal lies wholly against the external surface of one wall of the container, and fastening the folded-over end in such position by means of a strip of flexible material adhered over the edge of the folded-over end, along substantially the whole length thereof, the adhered strip extending beyond that edge of the heat-seal which is further from the edge of the folded-over end. In a preferred form of this method, the strip of flexible material extends at its ends beyond the edges of the folded-over portion, and is wide enough to extend over and beyond the fold of the container.

The method of United Kingdom Specification 1,302,450 is particularly useful for forming tubular containers for liquids that exert a sustained superatmospheric pressure in the container, especially beer and other carbonated drinks.

The present invention provides a plastics-film, container having an end closed by a bead seal formed between the opposed edges of said end and by said end then being folded over at least twice and secured in such position by a strip of flexible sheet material adhered over the edge of the folded-over end along the whole length thereof and to the adjacent wall of the container, the strip of flexible sheet material extending over the folded-over end of the container and being adhered also to the other wall thereof.

It has been found that the bead seal is stronger than the heat seal described in Patent Specification 1,302,450.

Preferably, the folded-over end of the container is also adhered directly to the wall of the container, at least after the first fold has been made; this adds further to the bursting and impact strength of the sealed end, and also facilitates the further folding operation.

Bead seals, which are well known in the art, are formed in plastics films by applying heat to superposed layers of plastics film to melt, or at least soften, adjacent edges and cause them to weld together to form a fusion-welded seam along the edge, the seam having the form of a beading. Such seals may be formed by clamping the film layers together with the edges to be joined protruding from the clamping jaws, and heating these edges, for example by radiant heaters or by hot air, to melt the edges and cause them to weld together. In another method, which is particularly suitable for forming seamed plastics-film articles continuously from a web comprising the superposed layers to be joined, the layers are simultaneously severed and sealed together by means of a heating element brought down through the web, or into close proximity to the web, between two spaced-apart pairs of clamping jaws. In an alternative method suitable for continuous operation with a web of the plastics-film layers, the layers are first severed midway between two spaced-apart pairs of clamping jaws, and the

severed edges are then subjected to heat to fuse them together.

Many machines for forming bead seals are commercially available and are suitable for forming the end seals of the containers of the invention. Machines designed for continuously severing and sealing portions from a web are generally preferred for economic reasons, especially those capable of operating at high output rates.

The present invention is particularly useful for providing containers, for contents under superatmospheric pressure, formed from tubular plastcs film, the containers being closed at least at one end, preferably at both ends, in the manner described. When closed in this way at both ends, such a container may be provided with a filling aperture in its wall, for filling by the method described in United Kingdom Specification 1,251,672. This method comprises: locating an aperture in the wall of the closed container over an orifice in a substantially smooth surface, said orifice being connected to a source of a gas at superatmospheric pressure; inflating the container by the introduction of said gas while the container wall surrounding said aperture is held substantially in gas-tight contact with said surface; and, while said container is still fully inflated and in gas-tight contact with said surface, sliding it along relative to said surface to bring that portion of the wall of the container which surrounds said aperture into contact with a supported flexible sealing strip held in substantially continuous relationship to said surface; and sealing the sealing strip to the wall of the container around said aperture, by applying heat if necessary.

One preferred form of the plastics-film container of the present invention will now be more particularly described by way of example with reference to the drawings accompanying the provisional specification, of which:

Figures 1 to 4 show, in plan, stages in one method of folding and sealing the end of the container;

Figures 5 to 8 show the corresponding stages in longitudinal cross-section;

Figure 9 shows in longitudinal cross-section a modified form of the folded and sealed end; and

Figure 10 shows in perspective a filled pack comprising the container sealed at both ends as shown in Figures 1 to 8.

Figures 1 and 5 show one end of the container, 1, which is a length of plastics tubular film having each of its ends closed by a bead seal, 2, formed between the opposed edges of the end, and having a filling aperture, 3, formed in the wall of the container, spaced sufficiently from one end to lie just within the part of the container that will assume a substantially cylindrical form on inflation. Figures 2 and 6 show the sealed end folded over once, at fold 4, upon one wall of the container, and adhered to the wall, suitably by means of a heat-sealable coating on the wall. Figures 3 and 7 show the container at the next stage, with a strip of flexible sheet material, 5, adhered to the other wall of the container, again suitably by a heat-sealable coating, the strip projecting beyond the end and beyond each edge of the flat container, and having its centre line, 6, just below the bead seal, 2, of the folded-over end. Figures 4 and 8 show the container after the flexible strip has been turned over along line 6, together with the end of the container, and adhered to the other wall of the container, the edges of the strip being adhered one to the other to form fins, 7. The folded-over end may also be adhered again to the container wall at the interface 8. These seals may be formed by heat-sealable coatings on the container wall and on the strip 5. In the modification shown in Figure 9, the bead seal, 2, has been below the level of line 6 at the stage shown in Figure 3, with the result that the finished end includes an additional fold, 9.

When the container is coated with a vinylidene chloride copolymer to provide gas-tight properties, this will serve also as a heat-seal coating for sealing the turned-over end to the wall, if desired. Polyester adhesives are especially suitable as heat-seal coating materials for the flexible strip, 5.

The tubular containers as described, when filled with a liquid or other material under superatmospheric pressure, give packages of substantially saddle-ended form, the two ends being separated (when the container is sufficiently long in proportion to its width, as will usually be the case) by a body portion which assumes a substantially cylindrical form on inflation of the container. When the contents of such a package are under sustained superatmospheric pressure, the cylindrical body portion, which is subjected to greater stress than are the end portions, is preferably surrounded by a supporting sleeve. For example, a strip of paper may be wrapped around the cylindrical portion of the container after filling, and adhered into tubular form. If such a sleeve is applied to the package while the contents are chilled, it will firmly support the cylindrical part of the package when this expands on warming up to ambient temperature. Such a sleeve has been applied in the finished pack shown in Figure 10, in which 10 is the saddle-shaped end, the fins, 7, also being shown, and 11 is the paper sleeve. The transverse edges of strip 5 lie just within the sleeve 11.

Various modifications may be made in the

container and method particularly described. For example, the end may be turned over more than twice upon the wall of the container, although this generally gives little further improvement. The end is not necessarily turned over each time in the same direction; thus, it may first be turned down upon one wall of the container, and preferably adhered thereto, and the turned-over end then folded over upon the other wall of the container, so that the two folds are formed in zig-zag fashion. The strip 5 will in such case be adhered to the other wall of the container in the step illustrated in Figures 3 and 7. Other methods may be used in either case for folding the strip 5 and adhering it to the container; however, by the method shown the occurrence of any looseness between the strip and the folded-over end of the container can be prevented, and this method is generally preferred.

Because containers made from oriented plastics films, such as polyethylene terephthalate film, will withstand considerable internal pressures without stretching or bursting, and because such films tend to give heat seals that are brittle or of low peel strength, the method of the invention is used with particular effect for sealing containers made from such films. The film is preferably in tubular form and is preferably biaxially oriented. For containing gas under pressure, it preferably bears a coating of vinylidene chloride copolymer or other gas-impermeable coating material, as previously indicated. The method is particularly useful for closing the ends of plastics-film containers, particularly tubular film containers, intended for contents under superatmospheric pressure, such as beer and other carbonated drinks. However, the seals may usefully be provided to close the ends of any container in which the seals are subjected to peeling forces by the contents. For example, they may be used for closing the ends of bags, including gusseted bags, for heavy and mobile contents which impose considerable peeling forces on the seals during handling.

The strip of flexible material used in the method of the invention may be, for example a length of self-adhesive tape, or a length of heat-sealable tape, or of tape coated with a heat-activated adhesive, activated at a temperature below the crystalline melting point of the plastics film forming the container. The tape may be made of plastics film, preferably the same as that from which the container is made (though not necessarily of the same thickness); or it may be of paper or of a woven or bonded fabric having a heat-sealable or contact-adhesive coating.

The following details of one particular example of the container of the invention are provided by way of illustration only, and are in no way limiting. The container is formed in the manner shown in Figures 1 to 8, from a 10 inch (25.4 cm) length of biaxially oriented tubular film of polyethylene terephthalate, having a wall thickness of 0.00138 inch (0.0305 mm) and a flat width of 2.7 inches (6.90 cm), and coated externally with a vinylidene chloride copolymer. The flexible sheet material for capping each end of the container is a strip of biaxially oriented film of polyethylene terephthalate 0.001 inch (0.025 mm) thick, 3 inches (7.6 cm) long (that is, in the direction along the width of the container) and 3.89 inches (9.90 cm) wide, and having a coating of polyester hot-melt adhesive. The first fold is formed at a distance of 0.25 inch (6.35 mm) from the bead seal, and the second fold at a distance of 0.375 inch (9.525 mm) from the first fold.

WHAT WE CLAIM IS:—

1. A plastics-film, container having an end closed by a bead seal formed between the opposed edges of said end and by said end then being folded over at least twice and secured in such position by a strip of flexible sheet material adhered over the edge of the folded-over end along the whole length thereof and to the adjacent wall of the container, the strip of flexible sheet material extending over the folded-over end of the container and being adhered also to the other wall thereof.

2. A container as claimed in claim 1 in which at least the first folded-over portion of said end is adhered directly to the wall of the container.

3. A container as claimed in claim 1 or claim 2 in which said end is folded over each time in the same direction.

4. A container as claimed in any one of the preceding claims formed from a length of tubular plastics film closed at both ends in the manner described in claim 1, and provided with a filling aperture in its wall.

5. A container as claimed in any one of the preceding claims formed from biaxially-oriented tubular film of polyethylene terephthalate coated with a gas-impermeable material.

6. A container as claimed in claim 1 and substantially as hereinbefore described with reference to the drawings.

7. A package comprising a container as claimed in any one of the preceding claims, and contents at superatmospheric pressure.

8. A package as claimed in claim 7 in which the contents are a carbonated beverage.

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1476636 PROVISIONAL SPECIFICATION
1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

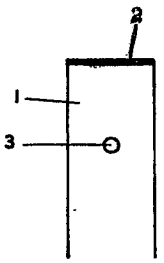

FIG 1

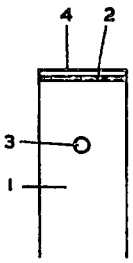

FIG 2

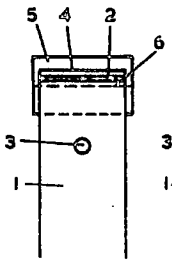

FIG 3

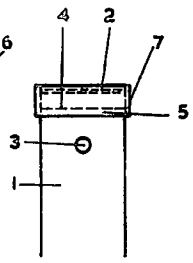

FIG 4

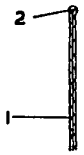

FIG 5

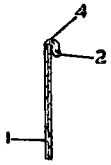

FIG 6

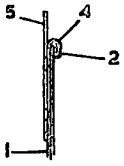

FIG 7

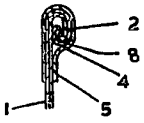

FIG 8

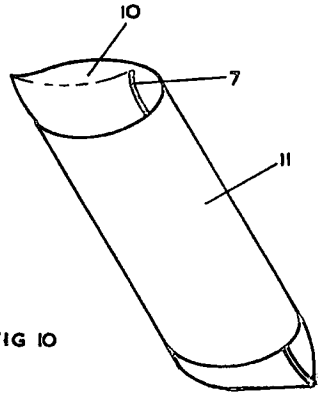

FIG 10

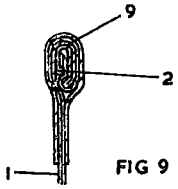

FIG 9